

Signal to Noise Ratio (SNR)

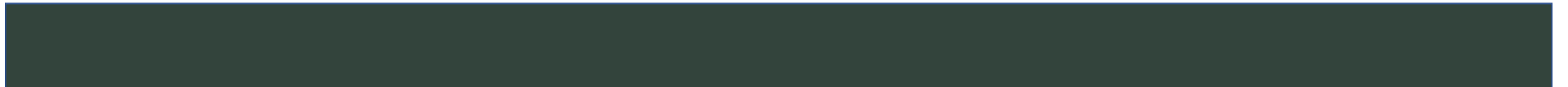
Shane McKeon

Journal Club

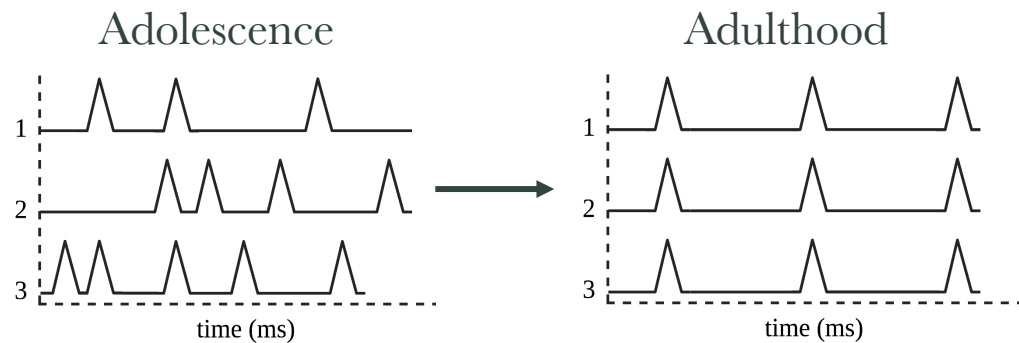
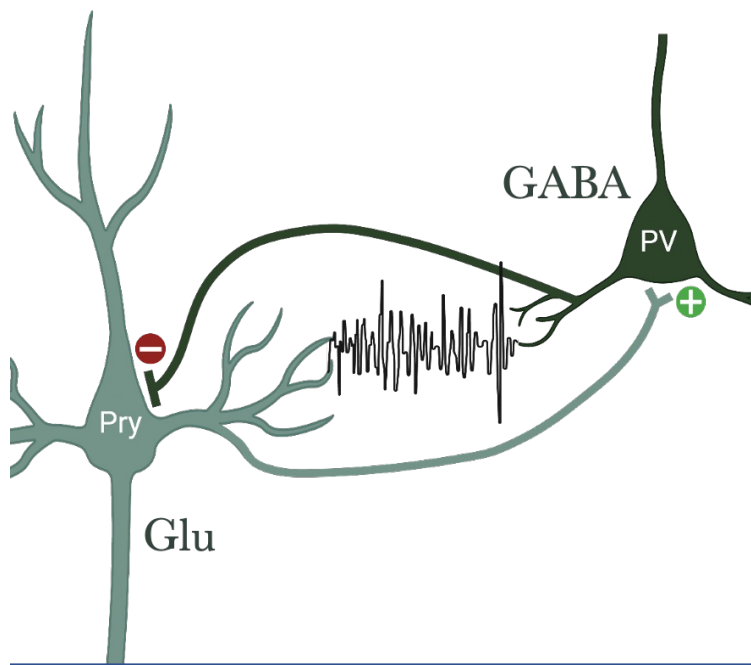
January 12, 2023

Take Home

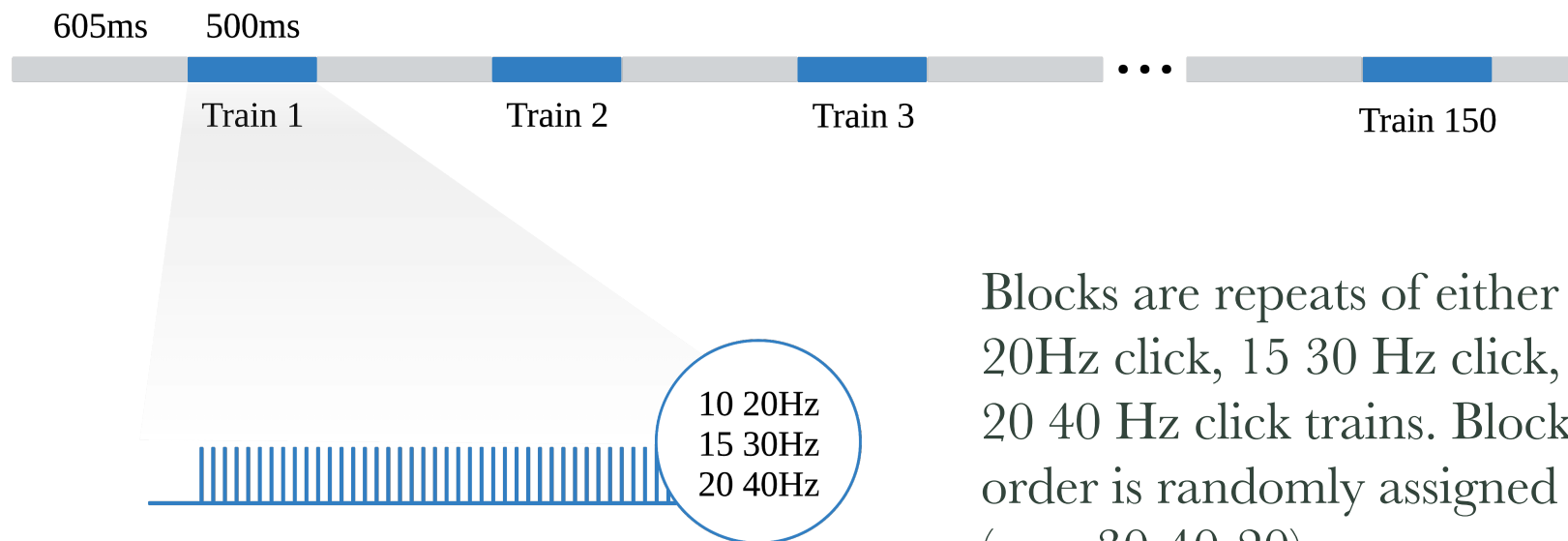
- SNR increases with age in the frontal & central regions
- Changes in SNR are primarily driven by decreases in induced (spontaneous) activity
- SNR measures are associated with FOOOF measures, exponent and offset, where greater SNR is associated with a flatter (lower) exponent
 - Sometimes
- SNR increases are associated with increases in Glu/GABA balance mainly in frontal & central regions



Synaptic interactions between PV interneurons and pyramidal support the suppression of spontaneous, asynchronous activity, in favor of evoked, synchronous firing and thus increasing SNR^{1,2}



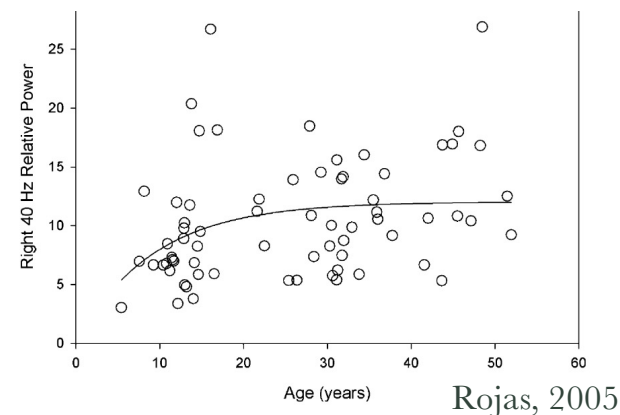
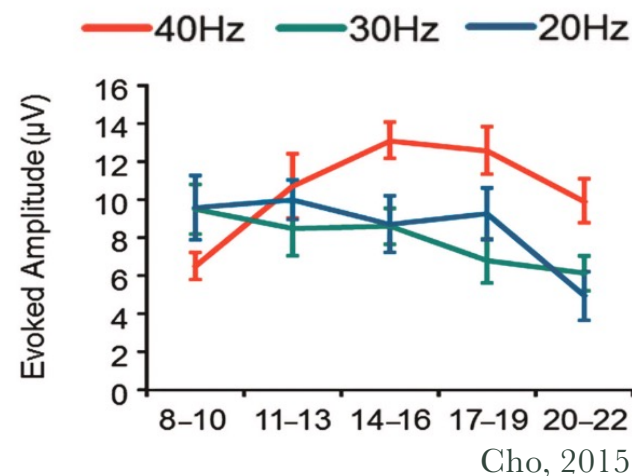
Auditory Steady State Task

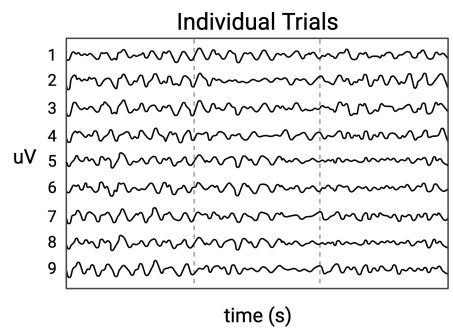


Blocks are repeats of either 10 20Hz click, 15 30 Hz click, or 20 40 Hz click trains. Block order is randomly assigned (e.g., 30-40-20).

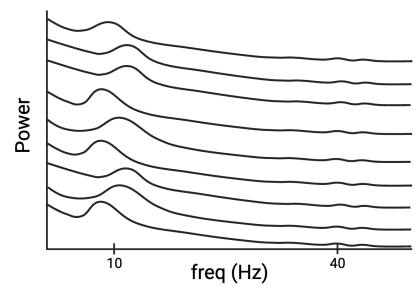
The auditory steady state response (ASSR)

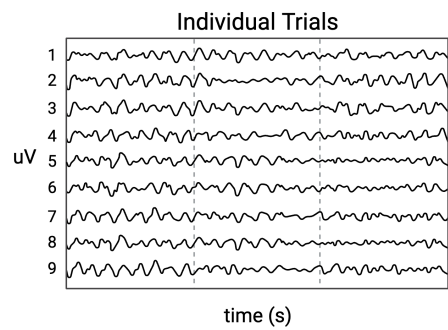
- Supported by GABA_a receptors cycling between excitation inhibition¹
- 40 Hz stimulus can be used as an indirect measure of the E/I balance²⁻⁴
- Significant involvement of the prefrontal cortex
- Age related increases in evoked power
- Reflect maturation of GABAergic inhibitory interneurons, synaptogenesis, and synaptic pruning⁵



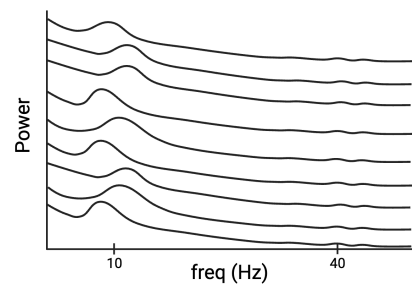


FFT

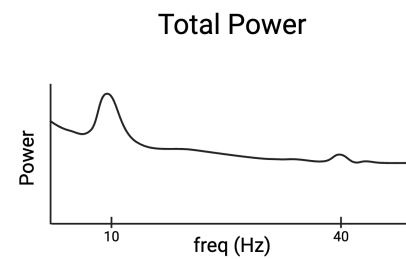


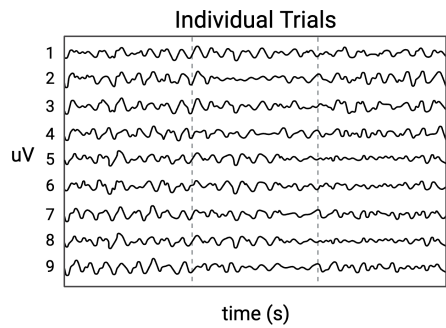


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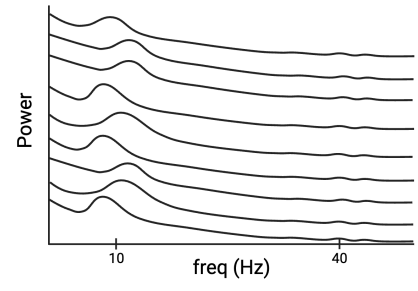


Avg across trials

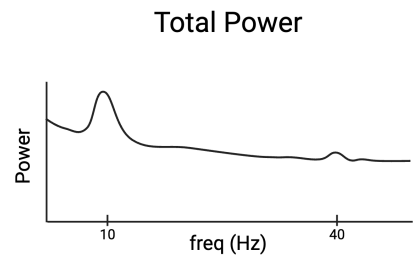




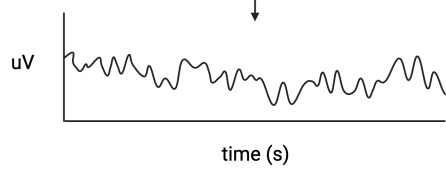
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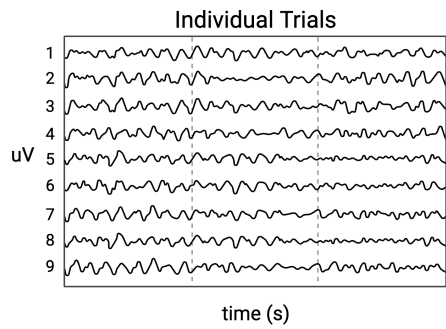


Avg across trials

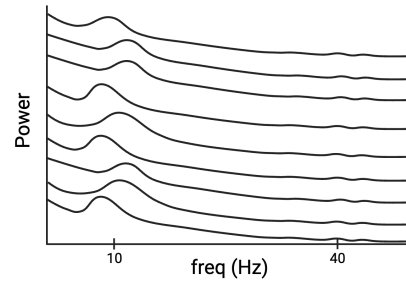


Average across trials

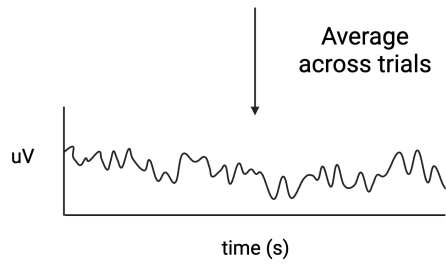
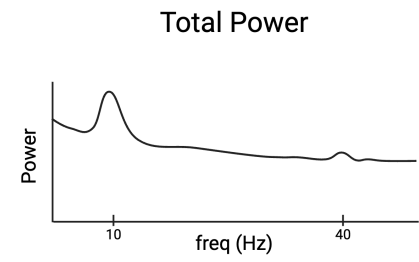




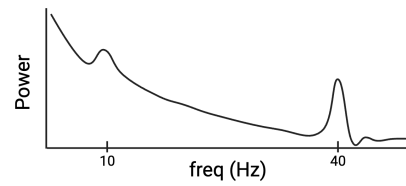
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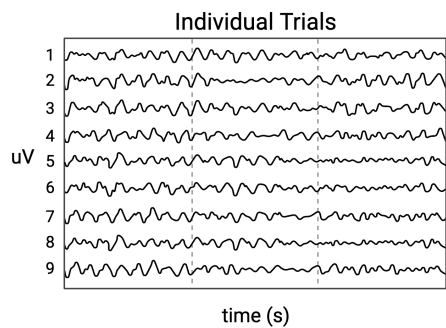
Avg across trials



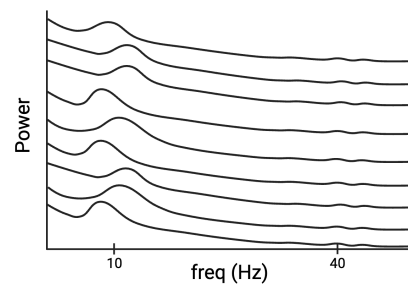
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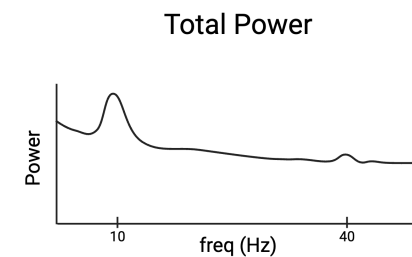
Evoked Power



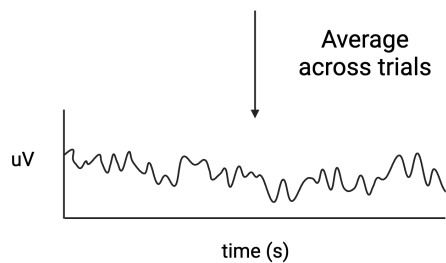
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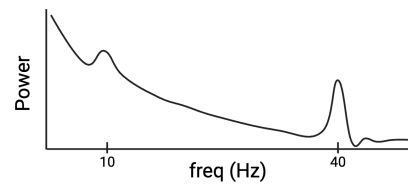
Avg across trials



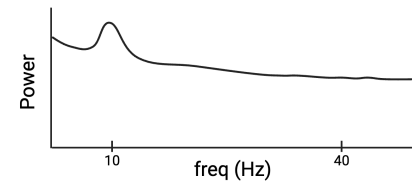
+



FFT

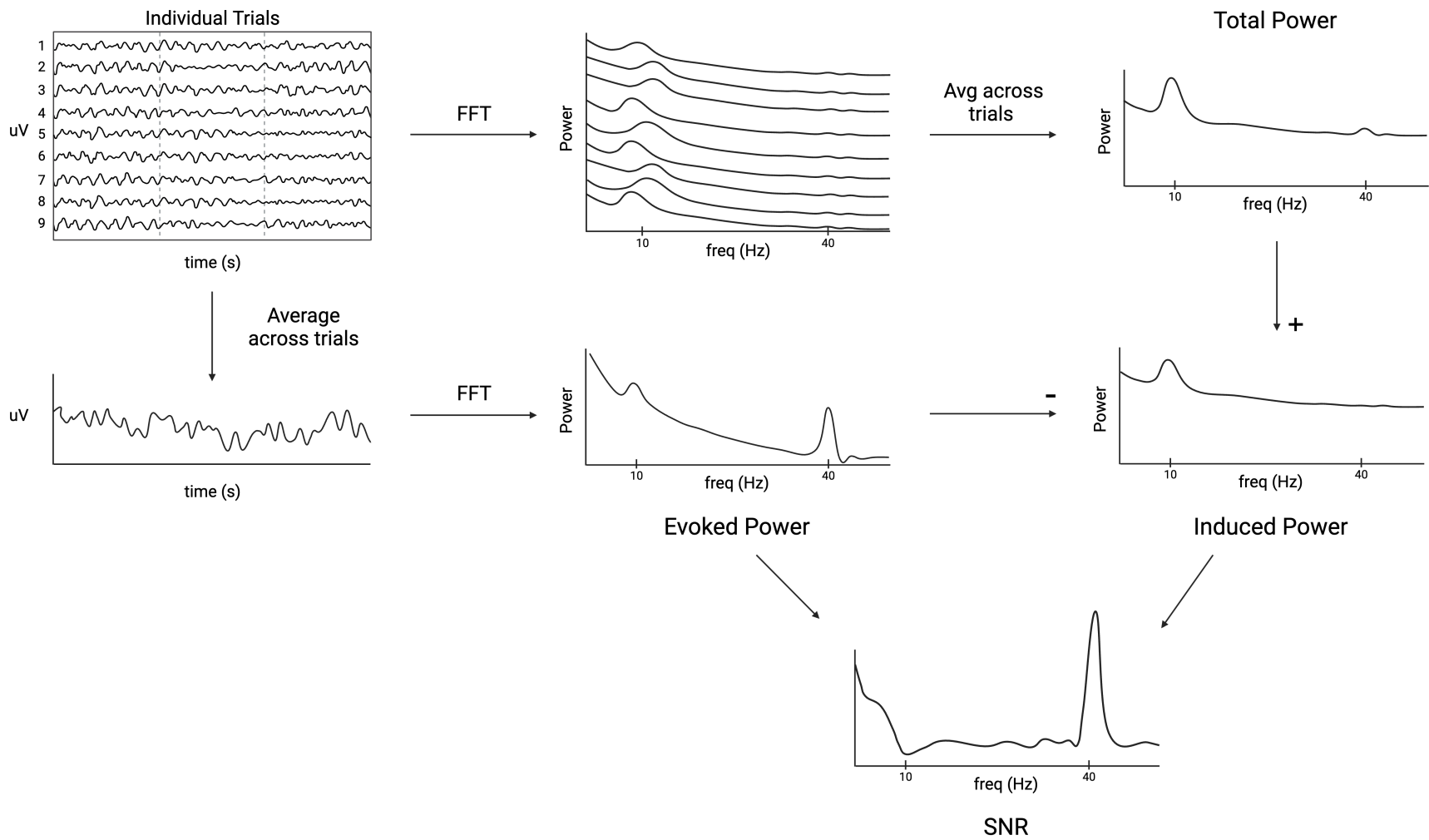


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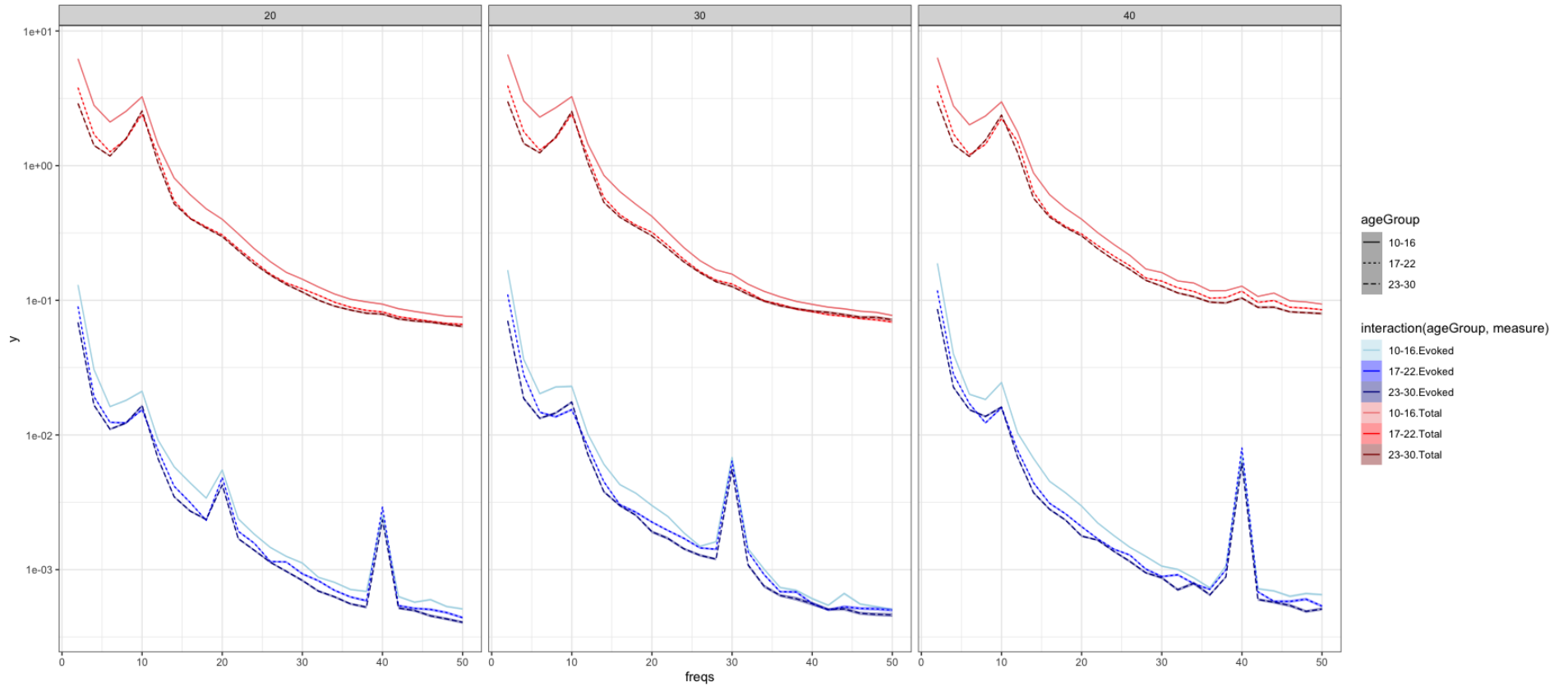


Evoked Power

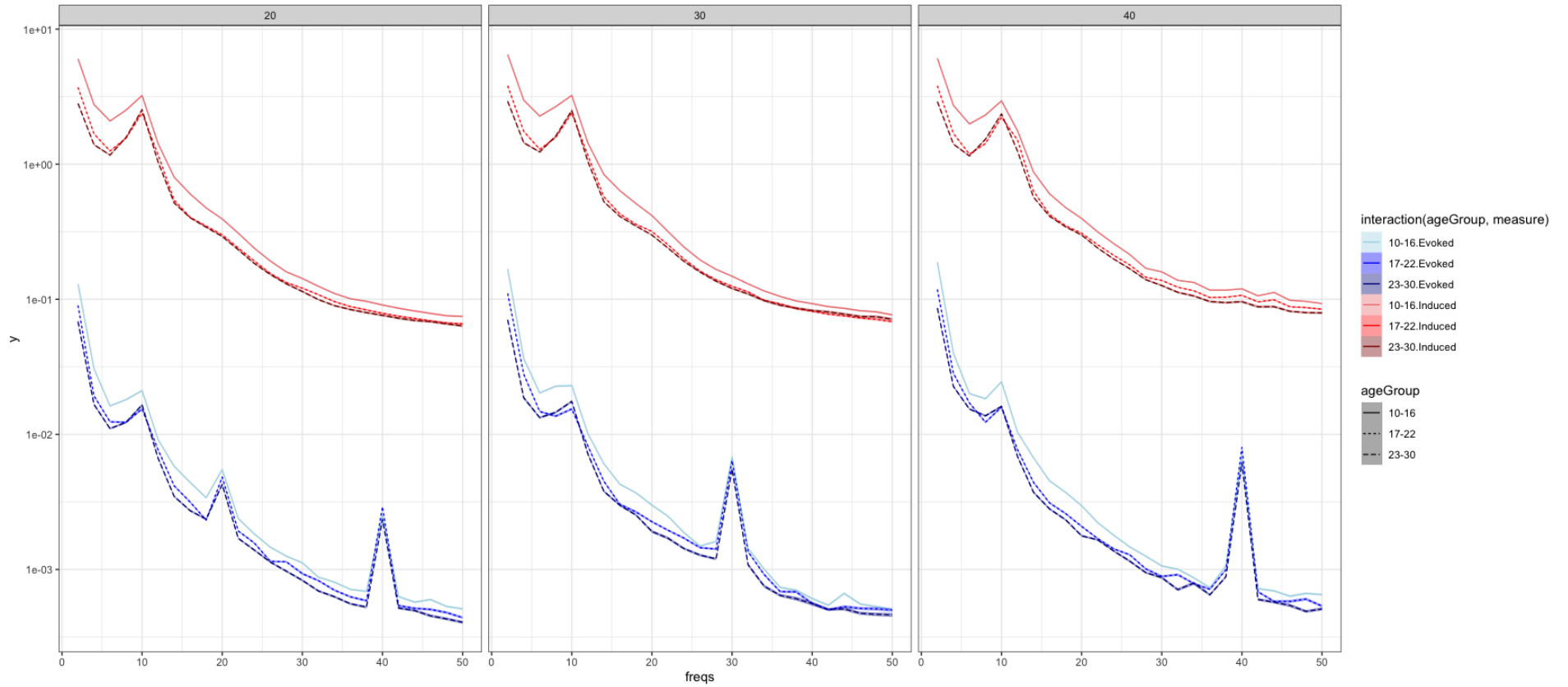
Induced Power



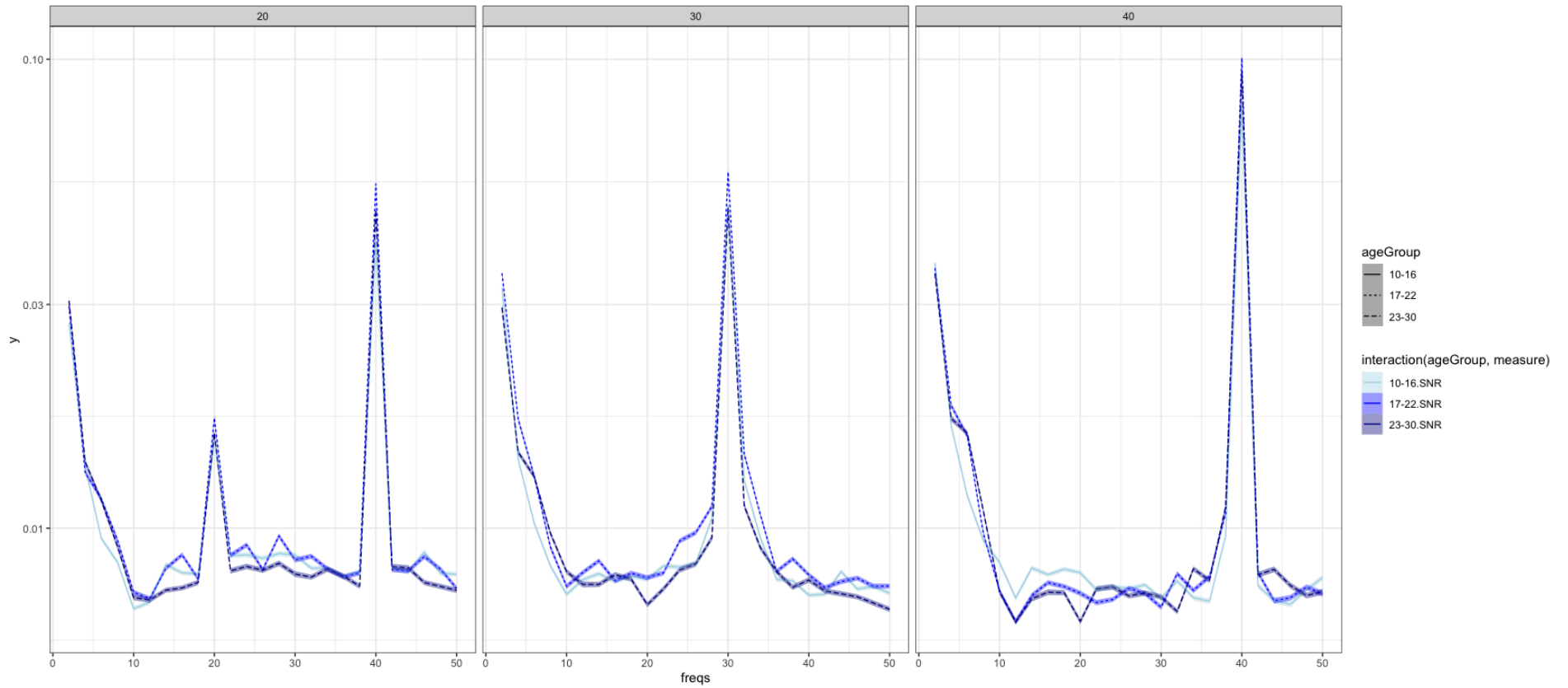
Evoked and Total Activity



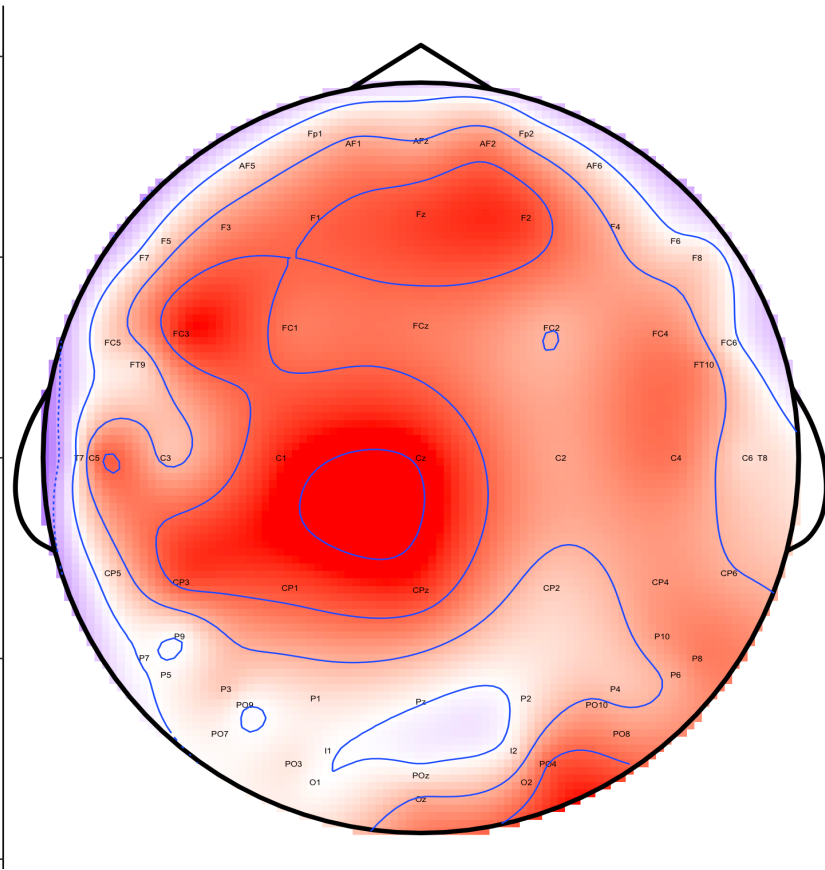
Evoked and Induced Activity



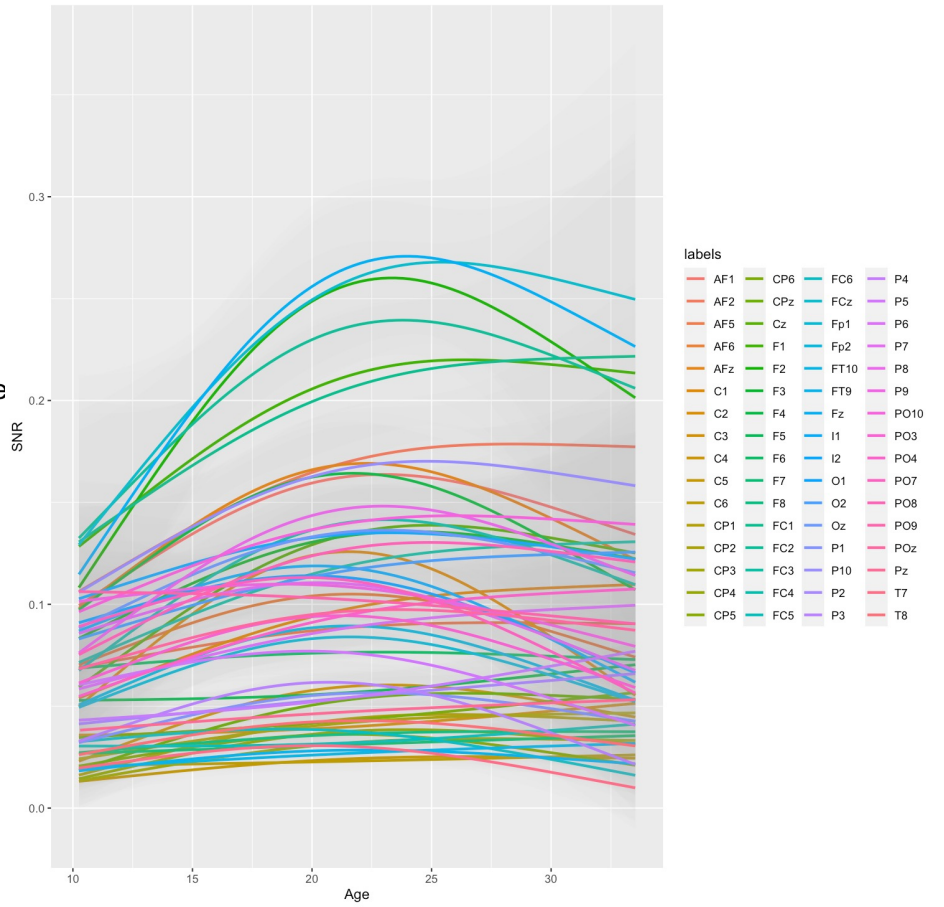
SNR across frequencies



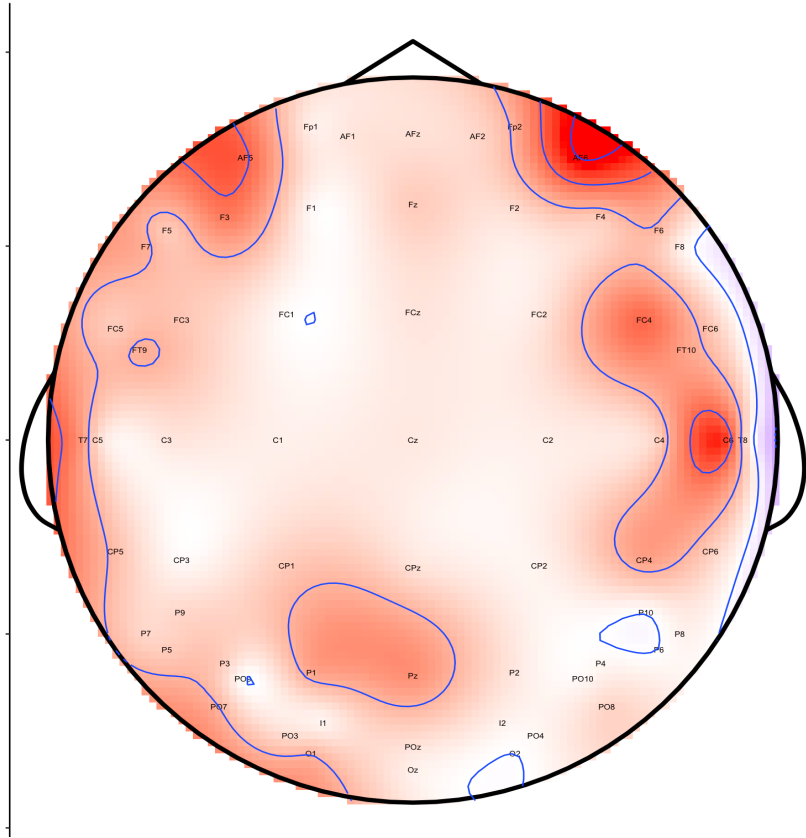
SNR



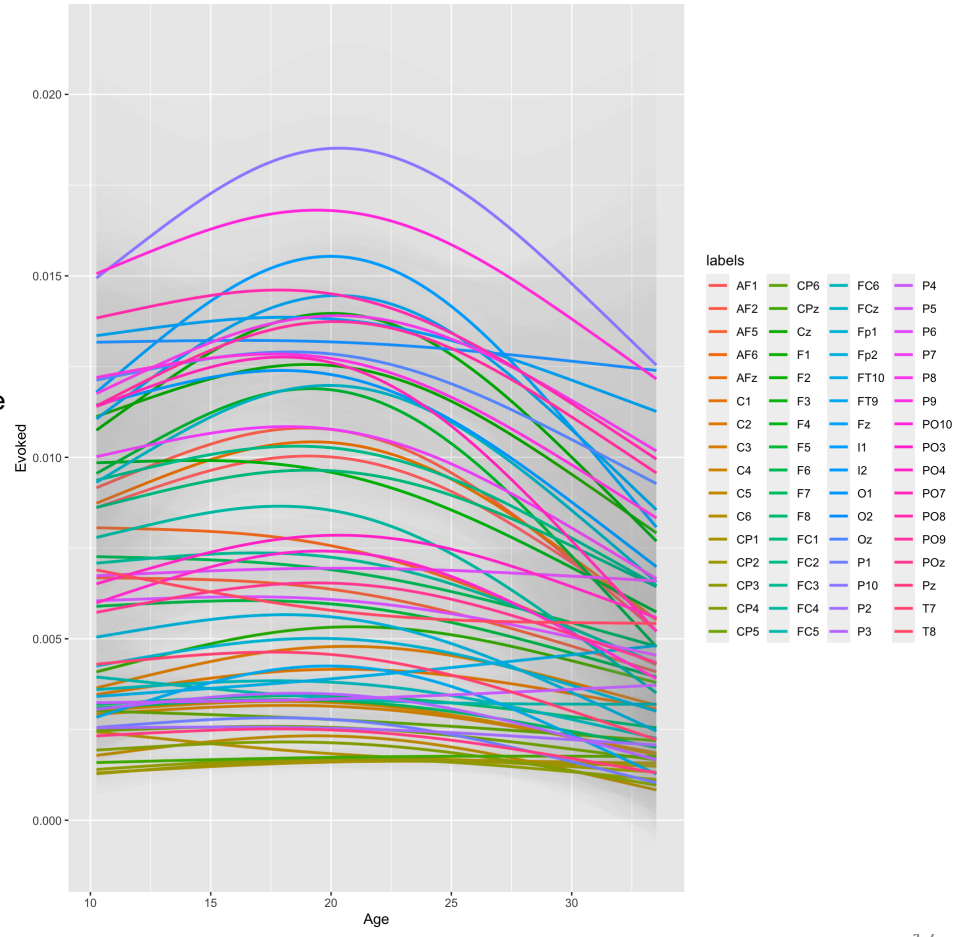
SNR, 40 hz response at 40 hz clicks



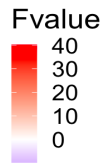
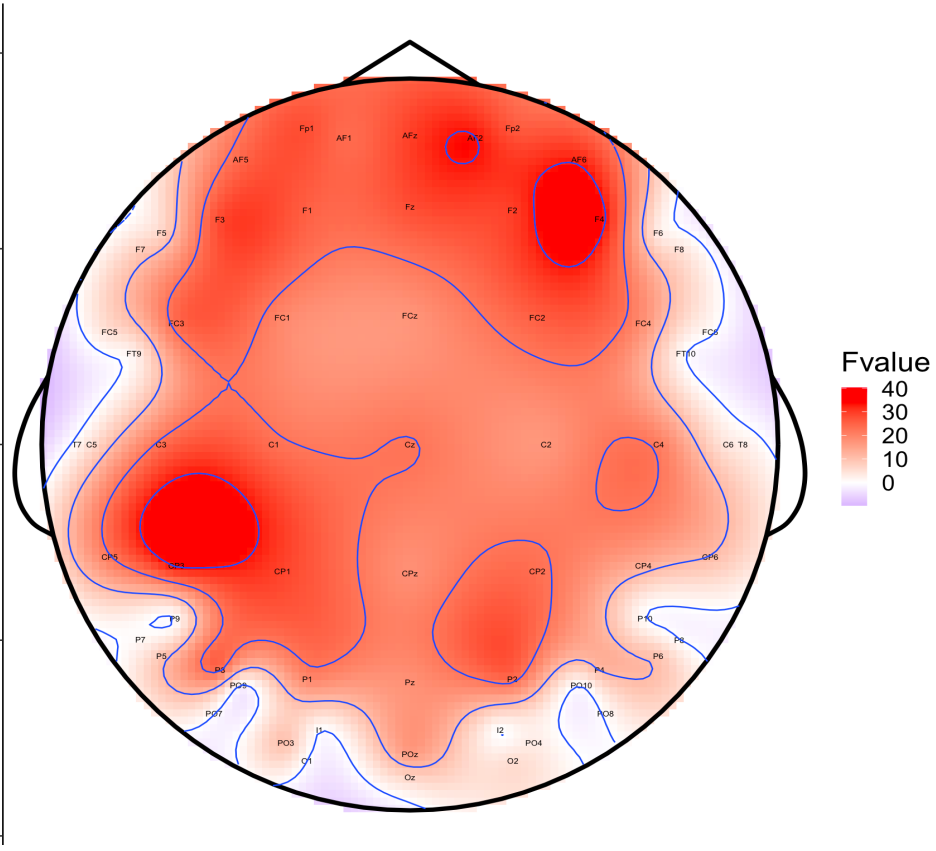
Evoked



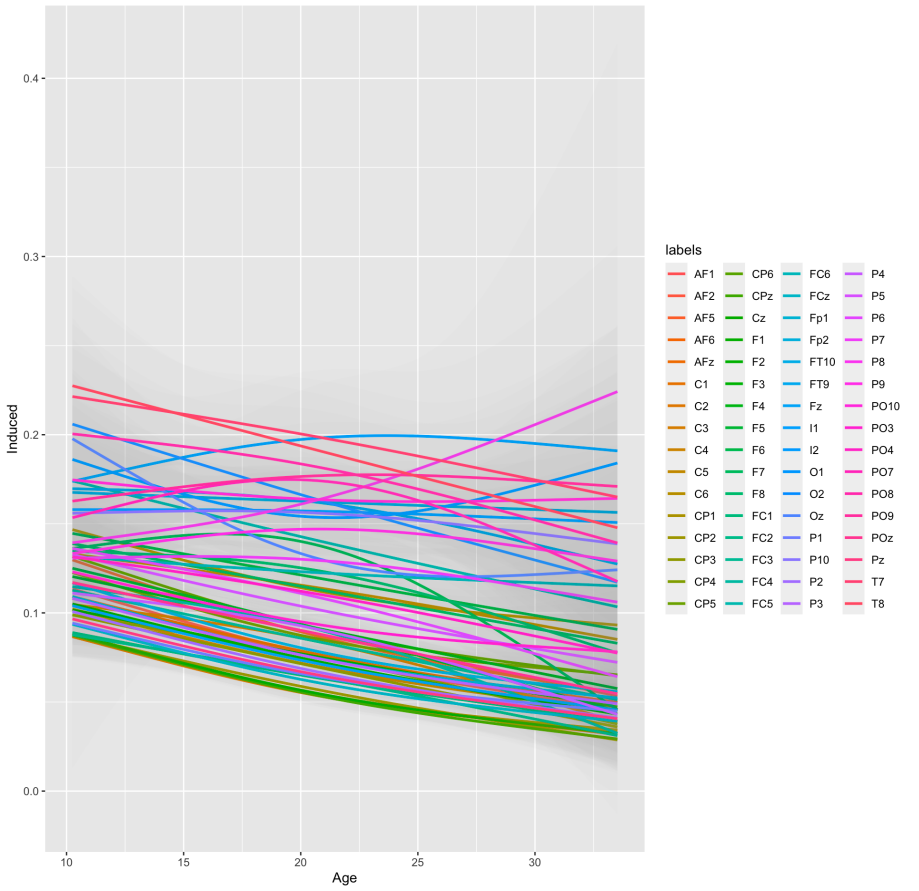
Evoked, 40 hz response at 40 hz clicks



Induced

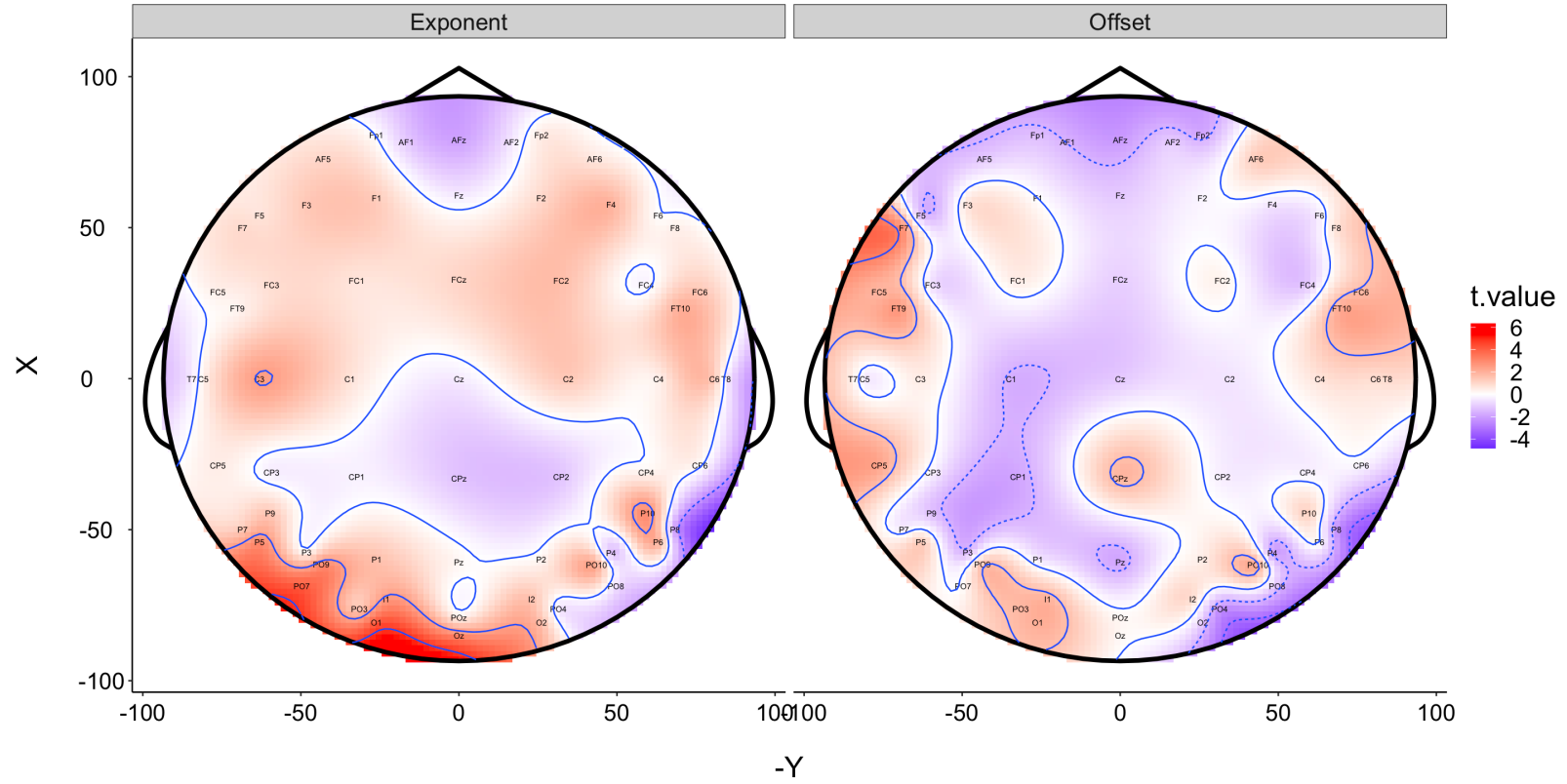


Induced, 40 hz response at 40 hz clicks

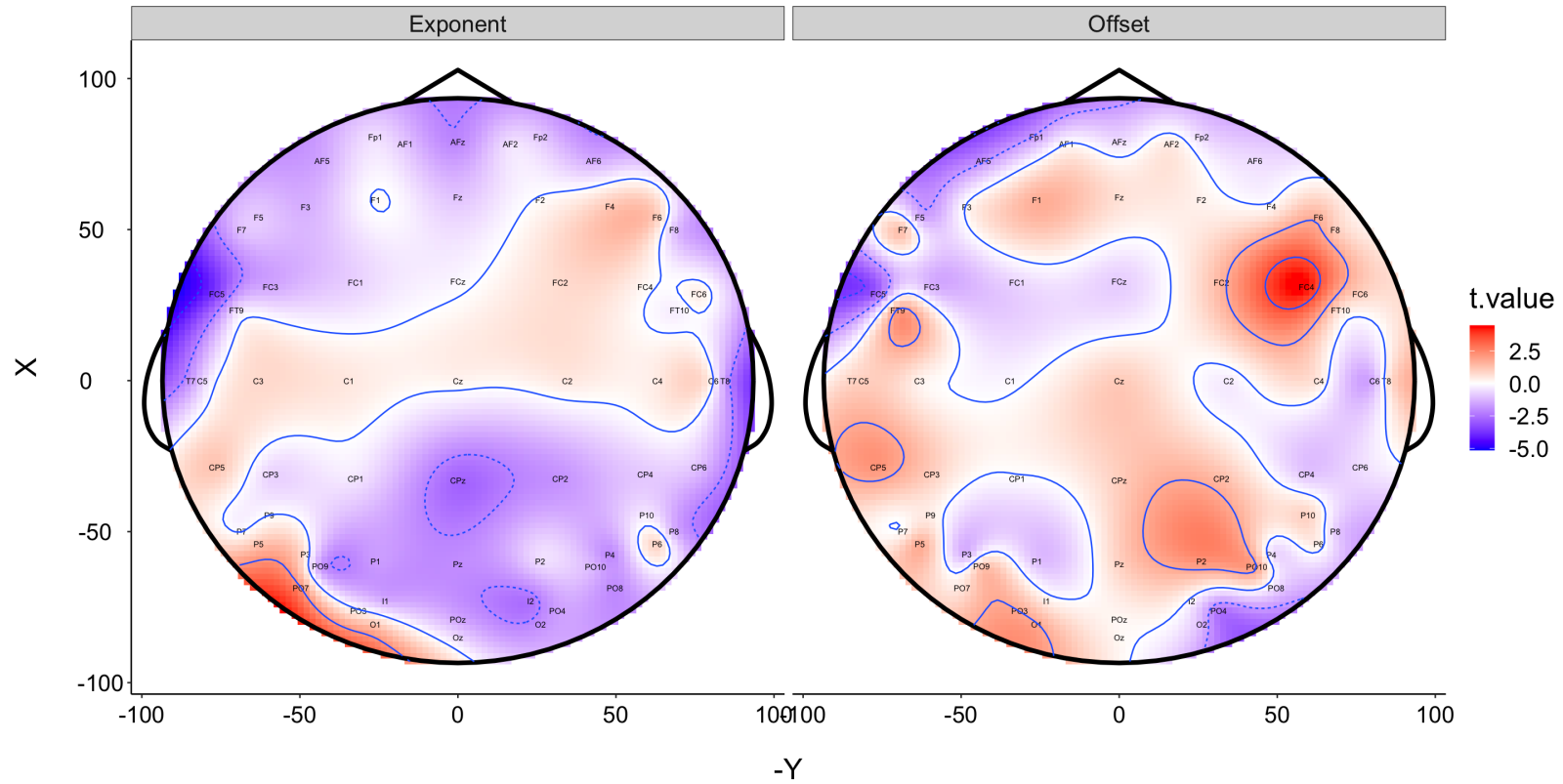


FOOOF

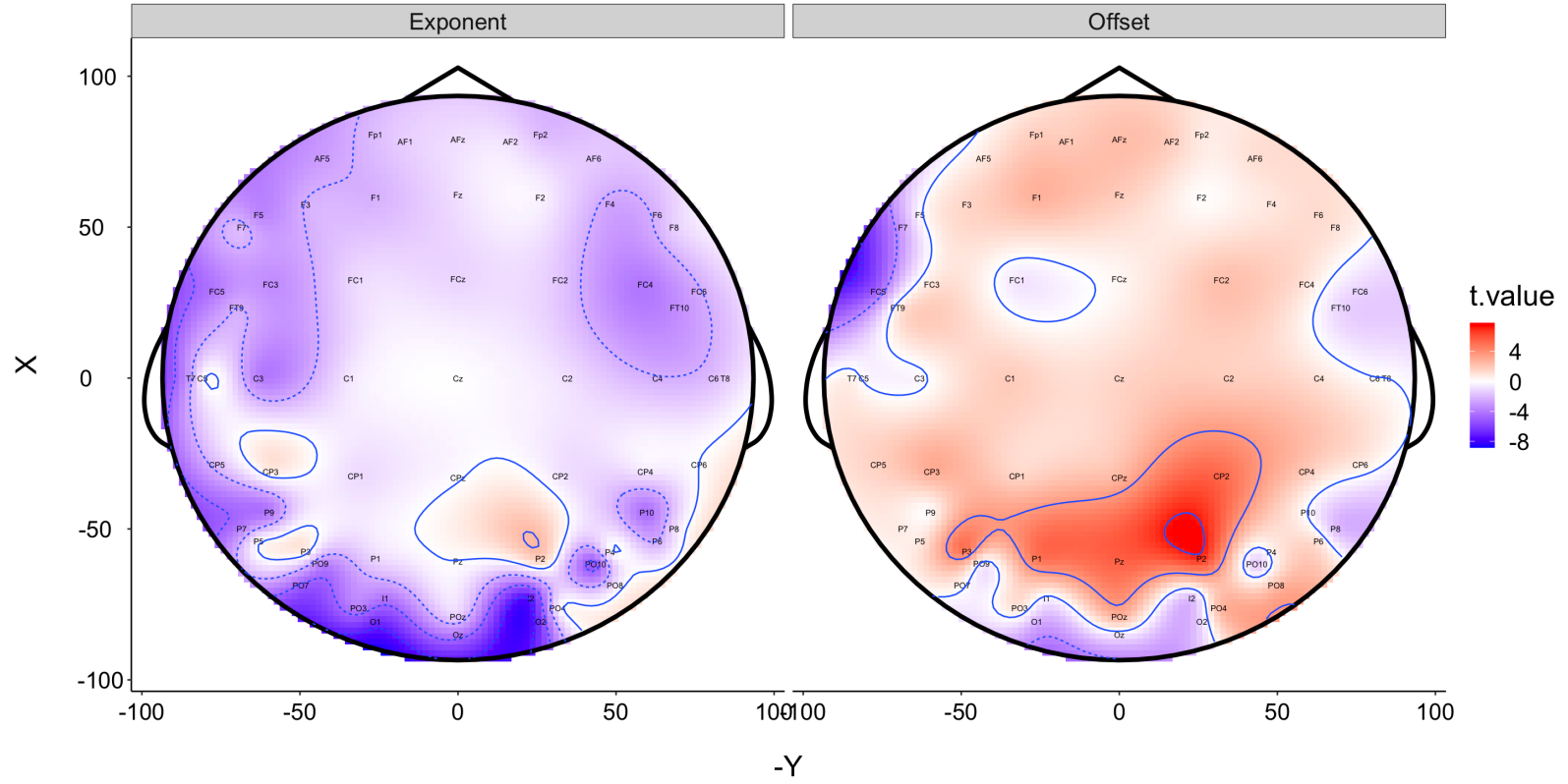
SNR vs FOOOF



Evoked vs FOOOF

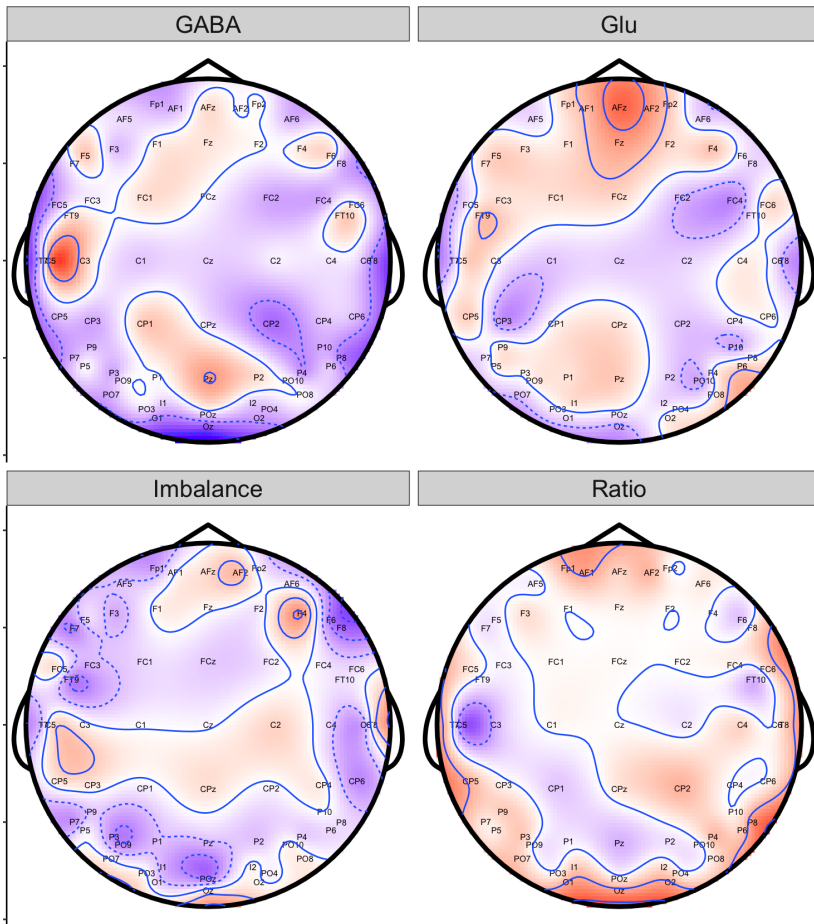


Induced vs FOOOF

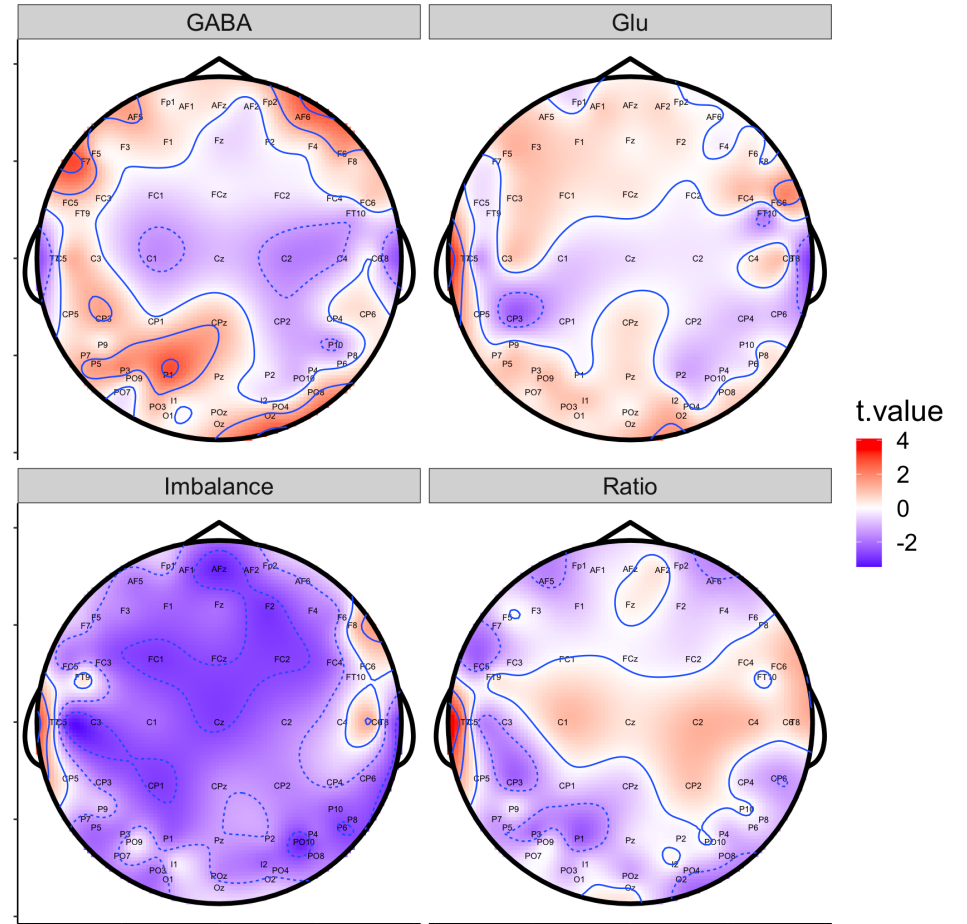


MRSI

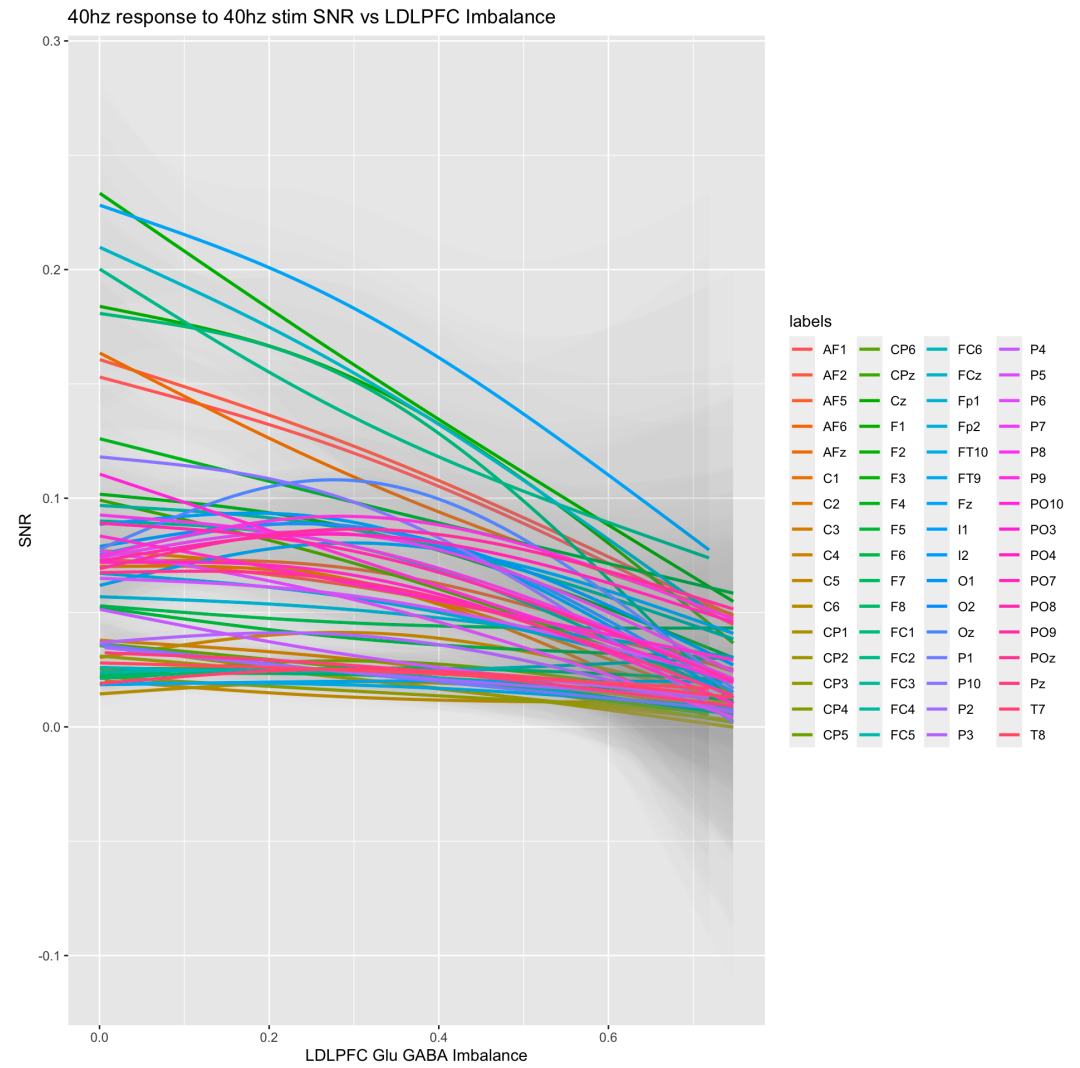
SNR vs RDLPFC



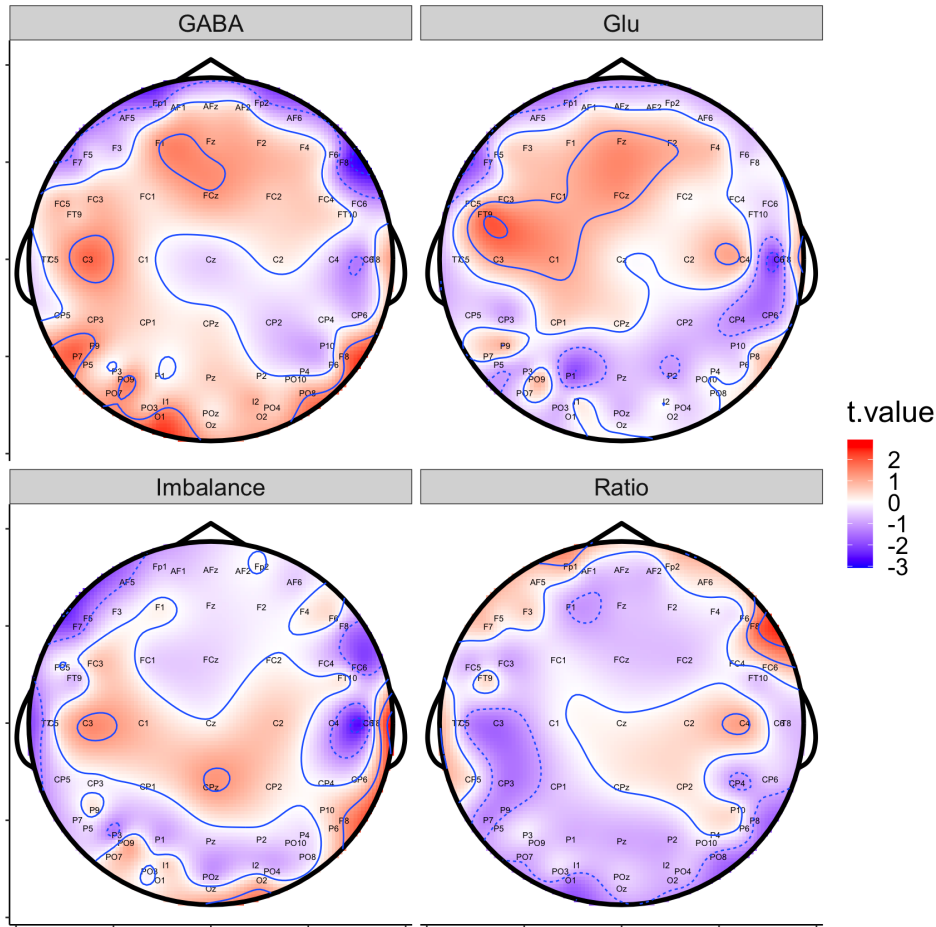
SNR vs LDLPFC



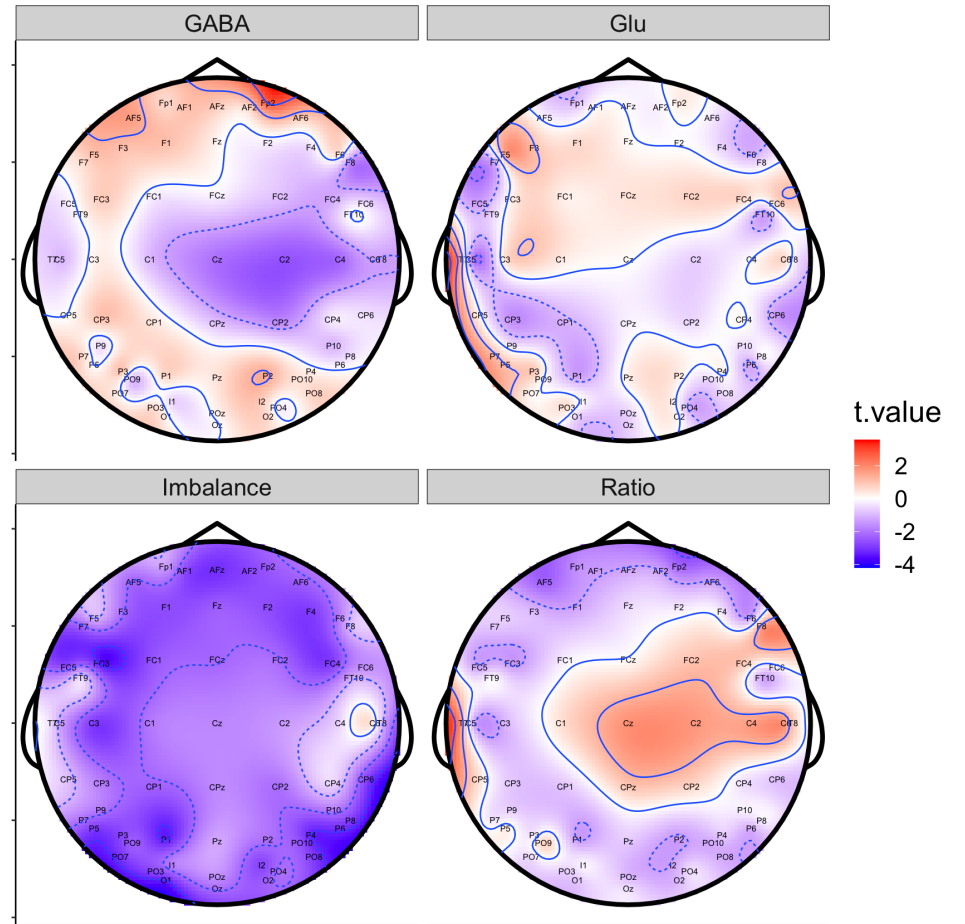
Increases in SNR
Increases in LDLPFC
GABA/Glu balance



Evoked vs RDLPFC

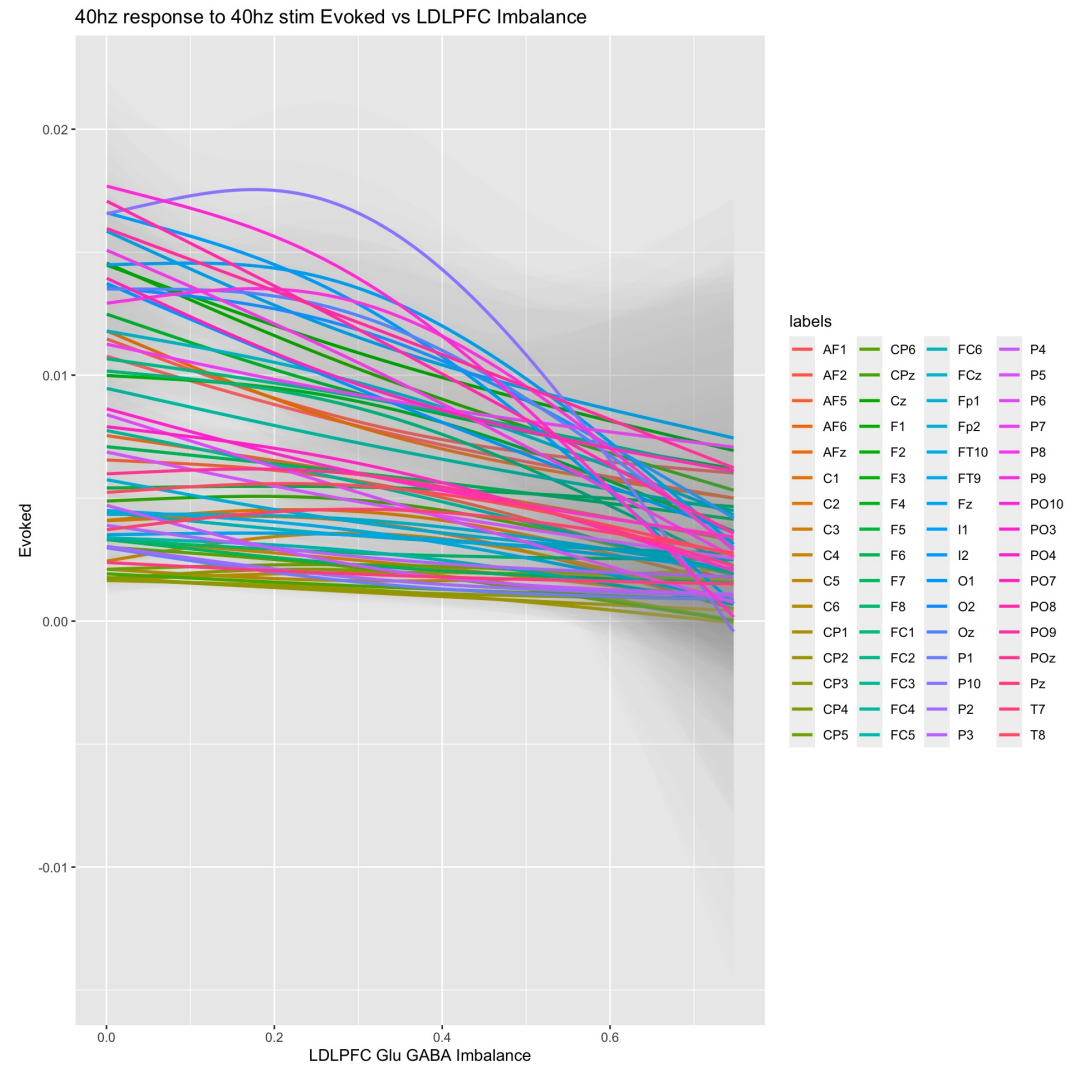


Evoked vs LDLPFC

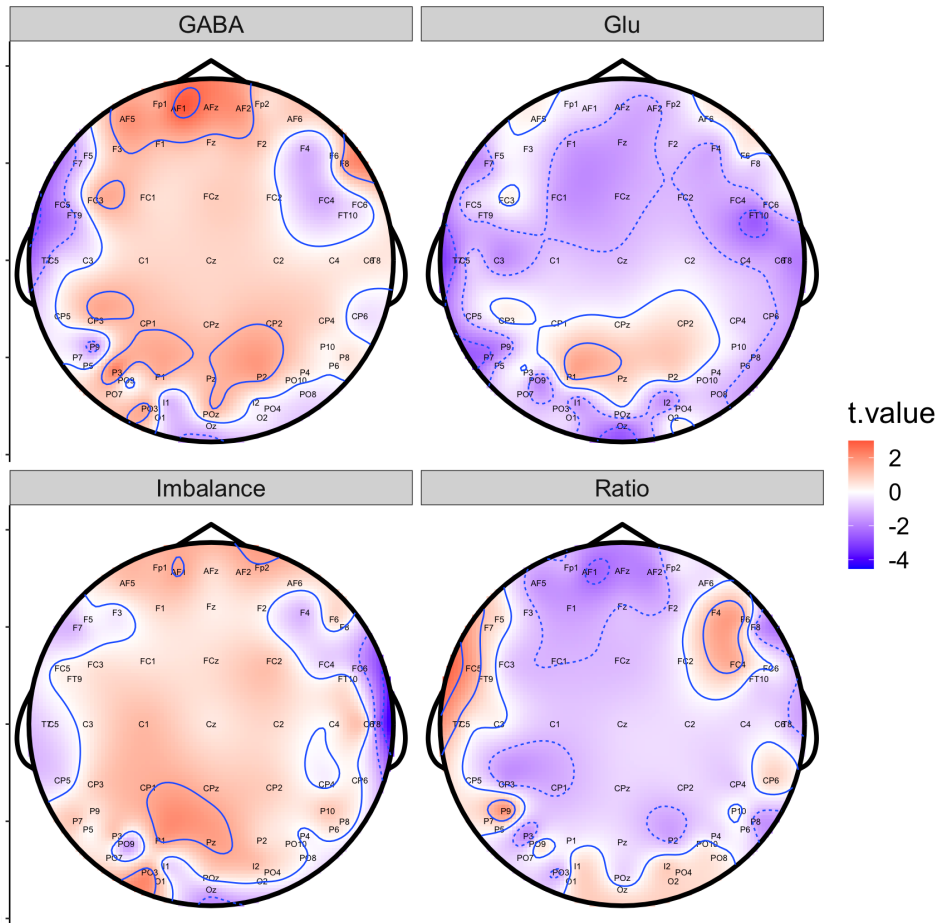


Increases in Evoked Activity

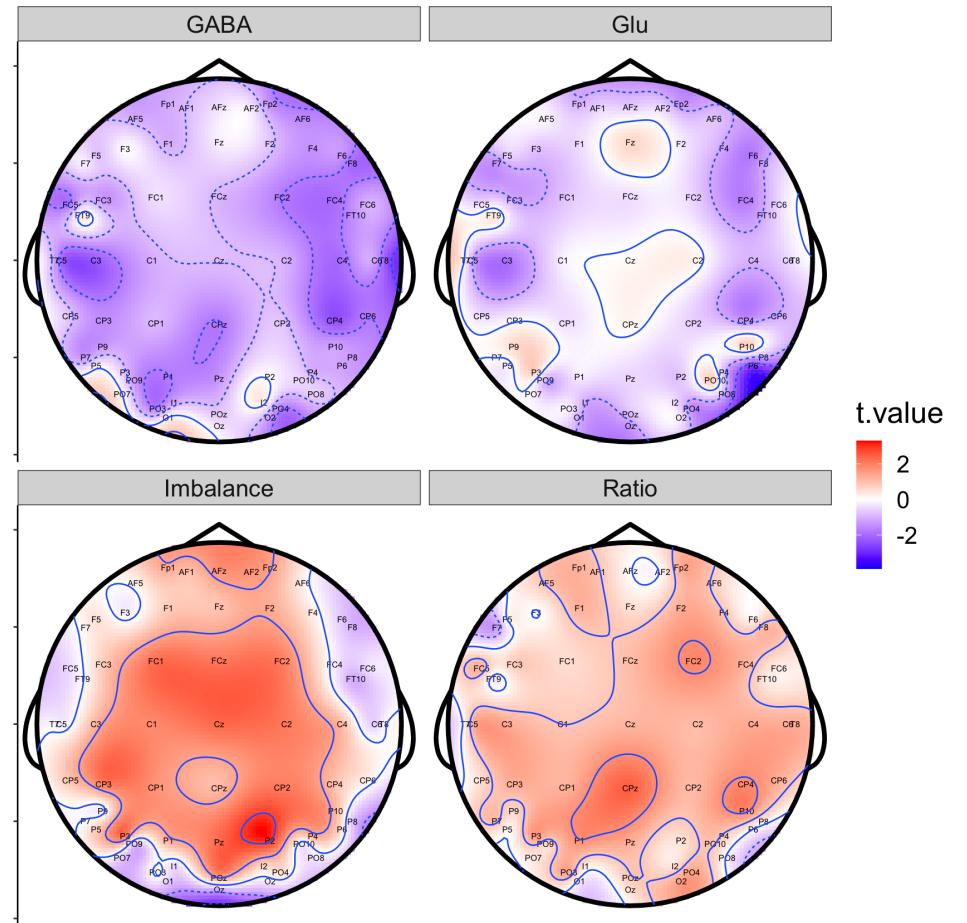
Increases in LDLPFC
GABA/Glu balance



Induced vs RDLPFC



Induced vs LDLPFC



Decreases in Induced Activity

Increases in LDLPFC
GABA/Glu balance

